

## Downtime is not an option in the world of biomed techs

Technology  
at Work

Whether he's on the job or off, Michael Blanchard's pager punctures his conversations like an over-excited exclamation point. Blanchard, a biomedical equipment specialist for Providence Everett Medical Center in Everett, Washington, can't afford to ignore it. Each call could mean an equipment breakdown that has a patient hanging between life and death.

Providence Everett is one of the Pacific Northwest's premier heart care hospitals. Blanchard and his eight-person team are responsible for keeping its sophisticated medical equipment in perfect running order on several campuses throughout this Western Washington city. It's a 24X7 job that never stops, and it comes with its own set of headaches. When you're in the middle of a CAT scan, you can't have the machine hiccup or spit out a faulty reading.

"Medical equipment has become a lot more complicated," says Blanchard, who has been a biomed technician for 25 years. "When I started out, there were still a lot of tubes. Transistors and integrated circuits were just coming in."

Today's equipment is a complicated tangle of the latest medical technology. Blanchard and his team handle all the equipment "to the walls." If a system is inside the walls, it's handled by the Facilities Department. "If you can plug it in and use it with a patient, it's ours," Blanchard says. "We do it all. Treadmills, CT scanners, MRI scanners, defibrillators. Everything is electronic, even the sterilizers, the thermometers, the blood pressure cuffs."



When his pager goes off, Blanchard doesn't know if it will be an EKG machine crucial to monitoring a post-surgery patient or a technician frustrated by a malfunctioning digital thermometer.

"Everything runs downhill," he says with a grin. "By the time it hits us, it's usually running pretty hard."

Although the setting is more exotic than some, and the consequences of a malfunctioning piece of equipment can be more severe, the basics are the same as you'd find in any shop. "Electronics are electronics," he says. "It's just how they put it all together that makes it different here."

How Blanchard handles a call depends on many factors. If he has a back-up unit, he'll swap out a problem machine so that care can continue. "For example, when a mobile X-ray machine breaks, we just shut it down and take it back to the shop. That way you're out of the way." But no duct tape shortcuts allowed. "We can't modify equipment," he says. "That's against the law."

Just the parts for some of the more sensitive and complicated machines can cost as much as \$20,000 for a single circuit board. Replacing the detector on a CT can be \$250,000. That means the hospital can't afford to keep an extensive parts inventory. The biomed team

works closely with its equipment suppliers to ensure fast parts delivery when needed and depends on the basics of good equipment care to keep each machine in optimal working order.

That's why maintenance is at the core of the hospital's approach. When you can't afford to have equipment go down at a critical point in patient care, it has to be.

Blanchard and his department adhere to a computerized preventative maintenance program. "Basically, it's cleaning," he says. "We keep every piece of equipment as clean as possible. Dust and heat are the enemies of electronics."

Right behind maintenance is troubleshooting.

"A hospital is just like any other work environment," Blanchard says. "First you're going to make sure the thing is plugged in. If it's still dead, check the fuse. Check the power to it. If there's construction going on – and there's almost always construction going on in a hospital – a circuit breaker can get tripped. You have to track that down. In fact, a good rule of thumb is to always check your power supply. Chances are, if you have a circuit that's weird, nine out of ten times you want to go back to the power supply."

Power coming into hospitals tends to be quite clean, Blanchard says. "It used to be, with a new generator, you'd turn it on and wait for the calls. Today's equipment is designed better, smoother, and we have very few problems."

Blanchard and his team rely on digital multimeters for the backbone of their troubleshooting. If he has a troublesome problem, he may pull out his handheld ScopeMeter® test tool. "That's if you want to see the rise time, the fall time. If there's any ringing. Sometimes in the Electro Surgery Unit you'll see scratchy wave forms if something's not grounded properly."

Still, it's the basic DMM that Blanchard and his team reach for first. They look for rugged, reliable units with a good set of features they can count on. "Every biomed technician has a DMM and current probes to measure ground leakage," he says. "The ones we use have a good look and feel, and they're reliable. There's a tone for ohms, a lot of ranges available, the ability to measure impedance and capacitance... They've got a lot of functions, and we use them all."

GE Industrial comes to the hospital once a year to calibrate all the test equipment as part of the maintenance program. "We use the DMMs to calibrate the other equipment, so we have to have documented proof that they've been calibrated as well," Blanchard says.

The lifespan of hospital equipment can be quite short, despite its cost. "The life of an EKG machine isn't very long because the technology advances so quickly," he says. That means that while the team doesn't have to work to keep obsolete equipment running, new technologies are always appearing on the scene to challenge their methods.

In the meantime, Blanchard and the other members of the Providence Everett biomed team will continue to concentrate on the basics: aggressive preventative maintenance, rapid response, and troubleshooting with test equipment they can stake their patients' lives on.

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